

SYNTHESIS AND CHARACTERIZATION OF SENSITIVE COMPONENTS: N-TYPE BINARY OXIDES (TiO₂, ZnO) AND P-TYPE CREDNERITE (CuMnO₂) FOR AMPEROMETRIC SENSOR

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Abstract

In the last years, an increasing number of oxides were investigated for detection of low gases concentrations from environment. More binary oxides with energy band gap between 2-4 eV (TiO₂, Nb₂O₅, Ta₂O₅, ZnO, SnO₂ and WO₃), when used with large specific surface area, present an *n-type* behavior like response to introduction of gases in small concentrations in ambient air. Other binary oxides as NiO, CuO, Cr₂O₃, Co₃O₄ and Mn₃O₄, and also the crystalline structures type perovskites (BaTiO₃, SrTiO₃, LaFeO₃₀) or crednerite (ABO₂, ex. CuMnO₂) presents an *p-type* characteristics for detection of gas traces in the environment.

The synthesis methods of heterostructured oxide materials, used in the specialized literature, have sought to obtain perfect structures with a high degree of homogeneity. As the morphology and structure of oxide material play an important role in their functional properties, lately, many efforts have been focused to choose the best synthesis method and the “design” of heterostructures of different architectures. The reason of these researches is mainly to demonstrate the fact that studied materials can be obtained by different methods, so to present interesting properties for proposed application field and to lead to achieving of new devices with new and improved functionality, and also synthesis technologies for sensitive modules.

In this study, we report the synthesis and characterization of *n-type* (TiO₂, ZnO) and *p-type* (CuMnO₂) semiconducting components, by hydrothermal methods at low temperatures and pressures using different precursors soluble in water. For obtaining oxide powders and crednerite materials, with morphology and desired size (nano and micro) for crystallite, will be used different synthesis conditions, varying the precursors, temperatures, pressures, synthesis times and/or solution pH. The obtained materials will be characterized by specific methods: crystalline phase of TiO₂ particles will be identified by X-ray diffraction (XRD), surface morphology and qualitative analysis by atomic force microscopy (AFM) and scanning electron microscopy (SEM), band gap determination with UV-VIS spectroscopy, and thermal stability by TG-DTA analysis. Based on these materials will be obtained some heterostructures *p-n* for development to a sensor with characteristics of diode.

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